

Speed File

TRI-SERVICE AUTOMATED PHYSICAL
EXAMINATIONS STUDY

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Training Aids

- View Graphs
- Light Pointer

INTRODUCTION - VADM Brown (etc.), ladies and gentlemen

It has been said about one of the advances in medicine - "That it will ever come into general use notwithstanding its value ... (is) extremely doubtful; because its beneficial application requires much time and gives a good bit of trouble both to the patient and the practitioner; because its hue and character are foreign, and opposed to all our habits and associations ... There is (even) something ludicrous in the picture ... of a ... physician" using the device. That was what the London Times said about Laennec's introduction of the stethoscope 134 years ago.

Although these words today still reflect the opinions of some observers on the wisdom of applying computers in clinical medicine, rapid electronic systems are quickly becoming an integral part of the future of medicine.

In light of recent advances in developing automated equipment, our present physical examination is antiquated. These advances have been successfully evaluated and utilized in major examining centers; such as Kaiser - Permanente in California, and the concept has recently been accepted by the U. S. Public Health Service for the projected "Preventi-

care" program. Kaiser has been using automated and semiautomated screening techniques for several years to determine if there is a significant likelihood of a disease being present.

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This program and similar ones which have blossomed recently were partially responsible for the Secretary of Defense establishing the Hospital Management Evaluation Committee in 1965. This Committee, composed of Asst Sec Def (Manpower), Deputy Asst Sec Def (Health and Medical) and the Surgeons General, was directed to study means of improving operation, and effectiveness of DOD medical facilities. In 1966, they established study groups to determine areas of medical service which might be feasibly automated. One of these, now known as the Working Group, was for Mod. of Routine P.E.'s. This group was charged with considering four questions; and after initial considerations, determined that sound decisions on the subject questions must be based on "an analysis of data which has been collected according to a pre-conceived plan and by methods designed to permit electronic processing." In short, we presently have nothing more than opinions without scientific support on the validity of the correct military PE process. It was determined that "further feasibility studies are not required prior to the immediate objective of developing an automated pilot PE system. This system would be designed to obtain necessary answers as well as be the prototype of a system eventually applicable to all military physical examinations. The acronym used for the system is AMES or Automated Medical Evaluation System. Other suggested titles were Automated Physical Examination or APE,

Tri-Service Routine Physical Examination or TRIPE, and finally Routine Automated Physical Examination - I will leave the initials of the latter to your own deduction.

During FY 66, the Navy did nearly 1.5 million physical examinations. All military services did 6.6 million. Almost 1/2 of this total were done at the 74 Armed Forces Examining and Entrance Stations. For this latter reason, it was deemed appropriate to install and field test an automated system in one of the larger AFEES, and Philadelphia was chosen. Present plans call for processing 100 men a day with the pilot system. This is about the number of people processed at both Kaiser Units in San Francisco daily.

V.G.
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The aims or requirements of the AMES are: (1) conserve medical manpower; (2) increase accuracy and quality of exam and recorded results; (3) complete forms automatically; (4) improve record storage and retrieval of statistical material; (5) provide data for further evaluation of validity of present exam; (6) provide more accurate baseline upon which to evaluate any change in military members' physical condition while on AD and at time of separation; and (7) accomplish this at an economical cost.

Close working liaison has been maintained with industrial, military, and academic agencies to obtain expert guidance in engineering design. The consensus is that automatic data processing and physiologic measuring equipment is available or can be readily developed, which will materially improve and standardize the routine medical examination. By incorporating

the latest recording, evaluation, and analysis techniques, an automated system can be developed to perform a more valid examination on large numbers of personnel. A system engineering approach is indicated for development of the prototype, for the establishment of levels of cost effectiveness, and trade-off studies to determine the selection of automated, semiautomated or manual accomplishment of specific tasks.

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PROGRESS TO DATE - In October 1966, a review of the objectives was presented to SecDef at which time he expressed full support of the project. A detailed description of the Phila AFEES operation has been prepared, a narrative description of the system was prepared by the Navy members, and a joint Detailed Narrative Requirement has been recently compiled. These documents define the concept and requirements of the exam and detailed description of the output desired.

Following consultation with the Military Research Community in 1966 and early 1967, it was the opinion of the Working Group and HMEC Review Group that USAF School of Aerospace Medicine (SAM), Brooks AFB, San Antonio, Texas, possessed the interest, technical expertise, and capability to develop the prototype system. SAM sought to do a similar project on their own in July 1966; however, the project was only approved and not funded because of overlap with MROPE. Because of this proposed project, SAM has been in a position of readiness for sometime to assume the project, when they receive a mission directive and resources.

Steps have now been taken by the Chairman of HMEC to have the project initiated as a Research and Development project through DDR&E. Following.

acceptance as an R&D project, it is anticipated a mission directive will be issued to the executive agent. The project had previously been presented to the 70th Joint Medical Research Conference of DDR&E.

Phase I of the program is development of the pilot project probably by Air Force School of Aerospace Medicine, as executive agent for installation in the Philadelphia AFEES.

FUTURE

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#4 The development and evaluation of the AMES pilot project over a 3-year period is expected to cost about \$2 million dollars. Following successful operation and achievement of the goals, it would enter Phase II and be expanded to automate all larger AFEES at a cost of about \$25.0 million. This amount is just a little over the cost of doing medical examinations at the 74 AFEES each year. Phase III then will expand to cover all physical examinations done by the military services and ultimately include diagnostic use in our hospitals.

V.G.
#5 Some of the measurements we expect to automate in addition to the paperwork are height, weight, pulse, blood pressure, phonocardiogram, electrocardiogram, hearing, vital capacity, hemoglobin, urinalysis, and other laboratory studies. Measurements which preliminary study suggests may also be automated are visual acuity, color vision testing, serology, skin fold measurement, and possibly the orthopedic range of motion and strength testing; or in other words, an orthopedic "Black Box". This latter device is one of the most novel ones and will require further development, but would be basically an adaptation of the "Exoskeleton" mechanisms developed for ONR by Cornell University Research Labs and now being worked on by

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General Electric. The exoskeleton "brain" is basically a power assist sensor just like power steering on a car but could be programmed to go through a prearranged series of movements. Proposals for such a gadget have been given to the Veterans Administration for use in physical therapy. Basic to such automation is the ability to disqualify a man who has a disqualifying condition by current physical standards without expending a significant amount of medical manpower time.

A number of contractors have already expressed a serious interest in doing the work on the pilot project.

The delay in getting the project off the ground for the past year has been mainly one of defining the portion which was R&D and that which is O&M. The second problem has been exactly which groups in the DOD had to approve the project. These problems seem to be pretty well resolved now, and it is hoped that the project will get moving again with designation of the executive agent and funding. It appears that DDR&E will approve the first half of Phase I, which amounts to systems analysis studies before actually procuring equipment. Competition for the defense dollar is critical at this time.

The most serious problem of this project compared to all other attempts at multiphasic screening examinations is one of language. Other efforts have dealt with the affluent society that can afford annual examinations in an internist's office. In AMES, we must deal with the lower mental groups (Category IV and V) also. Phrasing questions will be most difficult. As an example, at one of the Tennessee AFEES last year, a man checked yes to the question on SF 89, "Do you have homosexual

tendancies." In accord with current policies, he was taken to a separate room and interviewed by a physician and a psychologist. When asked if he knew what this meant, he replied, "Yes sir, I know what it means. I like my sex at home!" This is one of the real difficulties of computer usage in medicine. If the data is irrelevant, the computer won't improve it and automation of such information serves simply to cloak ignorance in a more attractive form. This is the programmer's slogan "GIGO" or "Garbage In, Garbage Out." The computer is not going to off set any present or future shortage of physicians either. A current and relevant quip states: "Any doctor who can be replaced by a machine, deserves to be replaced by a machine."

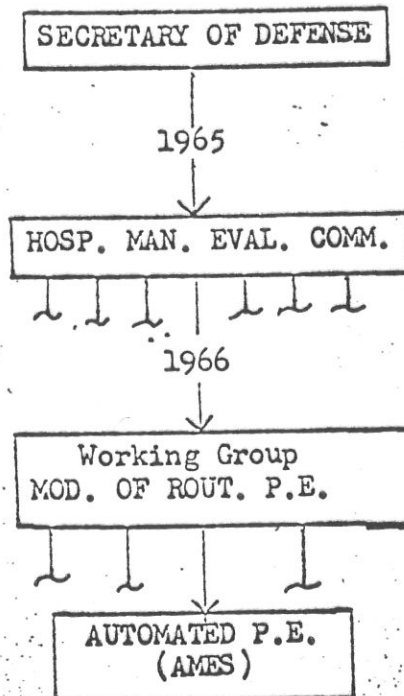
During February 1968, Pensacola Naval Aerospace Medical Institute presented a proposal to Chief, BUMED, to automate flight examinations and launch a new approach to annual flight physicals. This proposal has been reviewed by the Tri-Service Working Group, and the consensus was that the automated portion paralleled Phase III of the AMES; and in view of the USAF previous interest in such a program, a concurrent approach with AMES might be indicated provided the USAF and USN coordinated their efforts.

SUMMARY

Finally, in summary we are making progress toward getting the automated physical examination pilot project approved and funded. May be by 1975 it will do your annual physical.

VIEW GRAPH NUMBER ONE

BACKGROUND



VIEW GRAPH NUMBER TWO

AMES GOALS

1. Conserve medical manpower.
2. Increase accuracy and quality P.E.
3. Automatiz^e forms.
4. Record storage and retrieval.
5. Evaluate validity of current P.E.
6. Establish baseline to evaluate change.
7. Economical cost.

VIEW GRAPH NUMBER THREE

PROGRESS OF AMES

1. Project OFFICER
2. AFEES Philadelphia Survey - March 1967
3. Narrative Description - June 1967
4. Narrative Requirements - January 1968
5. DDR&E Review - February 1968
6. USAF SAM - Phase I - ?
7. AFEES Philadelphia Installation - ? FY 1971

VIEW GRAPH NUMBER FOUR

AMES PLAN

PHASE I - Develop and evaluate pilot at AFEES, Philadelphia.
Cost approx. \$2.0 million over three years.

PHASE II - Automate other AFEES and develop central data processing unit.
Cost over \$25.0 million over three to five years.

PHASE III - Adapt to all military P.E. (hosp, annual, separation and retirement, flight, submarine, etc.) and ultimately adapt for diagnostic purposes.

VIEW GRAPH NUMBER FIVE

PROPOSED AUTOMATION

PROBABLE

Height
Weight
Pulse
Blood Pressure
Hearing
Pulmonary Function
ECG
Hemoglobin :
Phonocardiogram
Urinalysis
Other

POSSIBLE

Visual Acuity
Color Vision
Serology
Skin Fold thickness
Orthopedic "Black Box"